Highlighted Pesticide Issues for 2003 and 2004

The PIRT Panel identified the following pesticide-related issues as targets for action in 2003 and 2004:

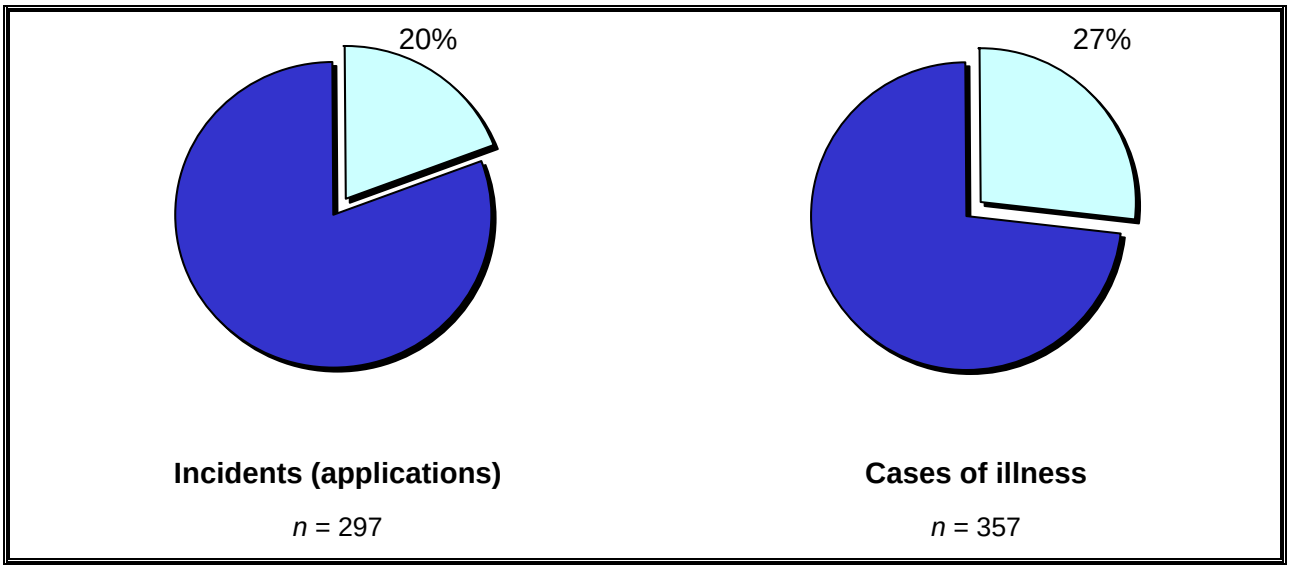
- Pesticide Spray Drift and Human Health Incidents
- Cholinesterase Monitoring
- Compliance with the Worker Protection Standard
- Changing Patterns of Pesticide Usage
- West Nile Virus

Pesticide Spray Drift and Human Health Incidents

Exposure to pesticide drift is an important cause of documented pesticide-related illness in Washington. The DOH data were compiled for drift incidents (applications that drifted) and cases (people reporting symptoms) for the years 2002 and 2003. A drift incident may involve multiple cases. Because pesticide illness reports are referred to DOH, all PIRT agency complaints or calls concerning drift-related illness are represented in the DOH dataset. The analyses in this report include only cases that DOH classified as definitely, probably, or possibly (DPP) related to pesticide exposure.

During the years 2002 and 2003, pesticide drift was involved in 58 (20%) of the 297 incidents and 95 (27%) of the 357 DPP cases with at least one symptom. Figure 2 shows drift as a proportion of all DOH DPP cases and incidents for 2002 and 2003 combined.

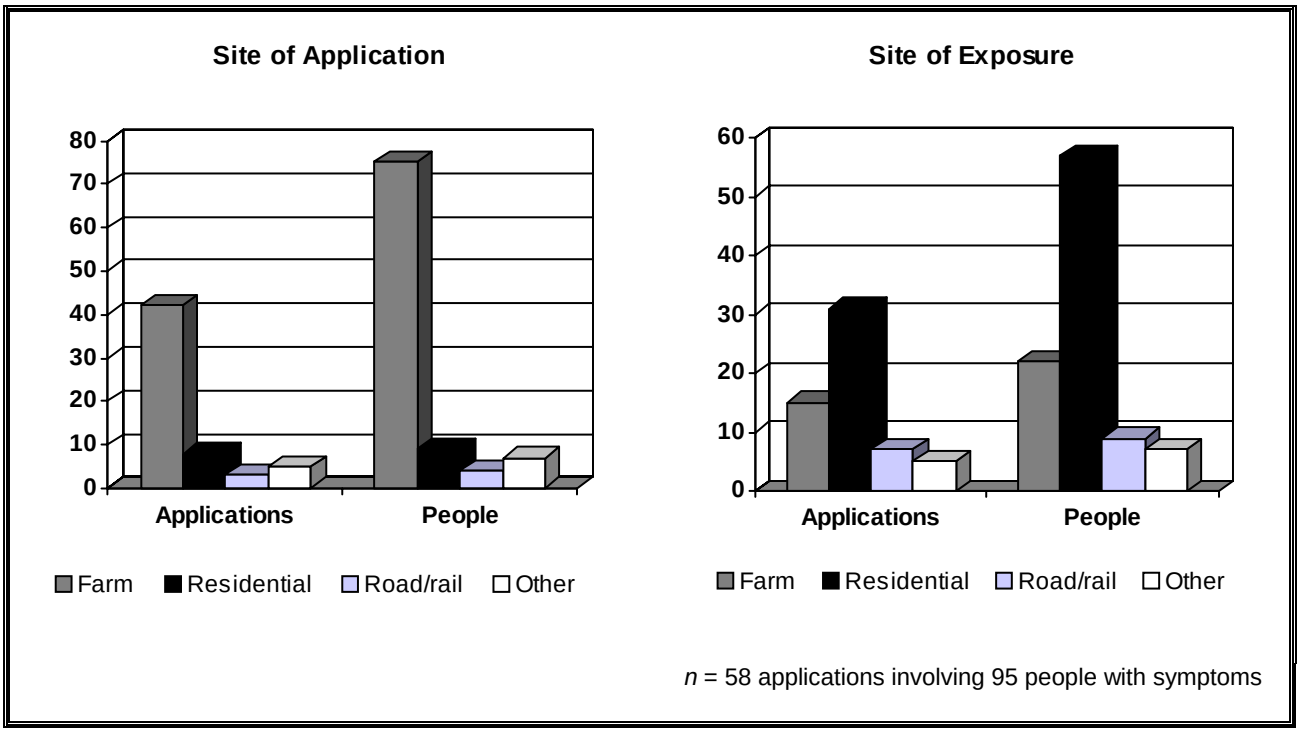
Figure 2. Drift as a Proportion of all DOH DPP Cases and Incidents, 2002 and 2003



Agricultural applications to farms were involved in 42 (72%) of the 58 incidents and 75 (79%) of the 95 cases. However, farmers and farm workers were not the main recipients of pesticide drift. Figure 3 shows DOH drift cases by site of application and site of exposure. Twenty-three percent of the reported cases were on-farm exposures to drift, while 60 percent of the reported cases

involved individuals who were exposed at their residence. As housing developments continue to expand into agricultural areas, reports of agricultural drift onto residential property may increase.

Figure 3. DOH Drift DPP Cases by Site of Application and Site of Exposure, 2002 and 2003



There were seven reported potato application drift incidents involving 43 symptomatic people during 2000 and 2001. The number of reported potato application drift incidents dropped to three involving six symptomatic people in 2002 and 2003.

Figure 4. DOH Agricultural Drift DPP Cases by Crop Type, 2002 and 2003

Of the 42 incidents of drift involving agricultural applications during 2002 and 2003, 26 (62%) involved applications to tree fruit (Figure 4).

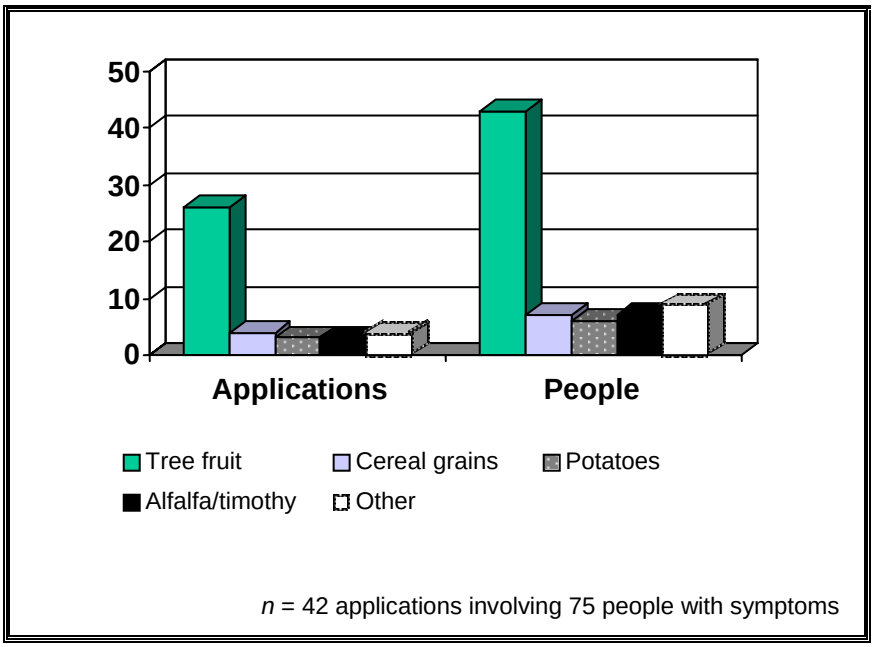
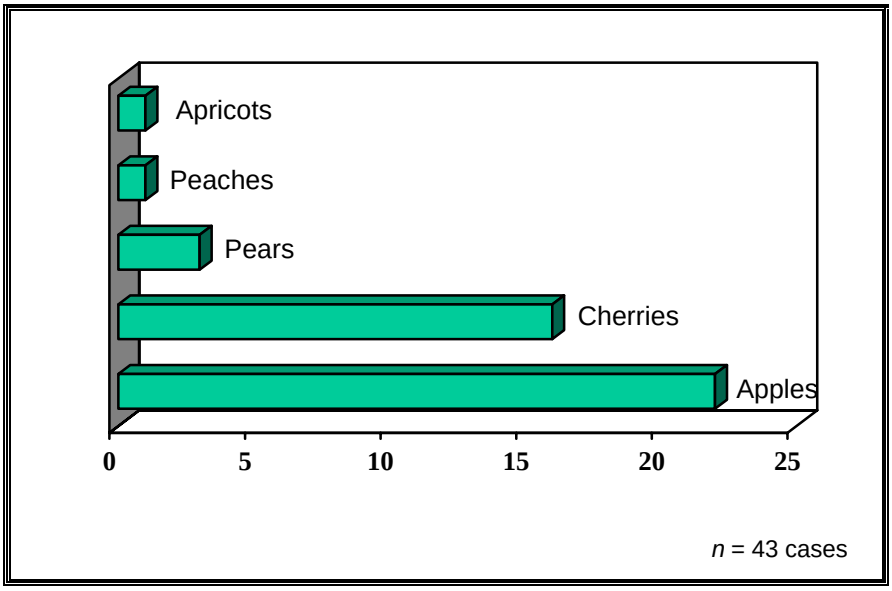


Figure 5. DOH Drift DPP Cases Involving Tree Fruit, 2002 and 2003

Most of these occurred during treatment of apple and cherry orchards. This is consistent with past years and reflects the large tree fruit industry in Washington (Figure 5).



Medical Outcome of Drift Exposures

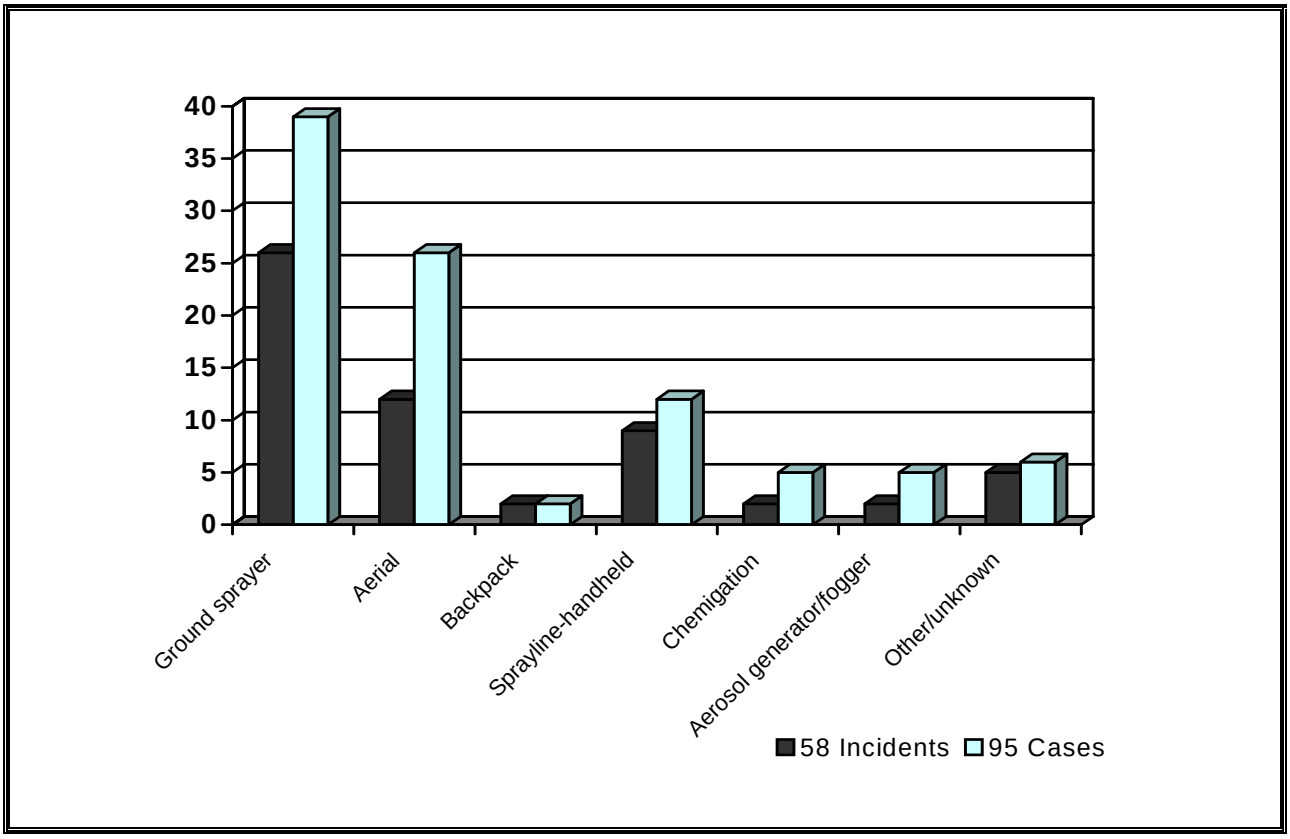
The most commonly reported symptoms of pesticide drift exposure were irritation and mild systemic symptoms. These included respiratory symptoms such as burning in throat, shortness of breath, coughing, wheezing; skin irritation and rash; eye irritation; and headache and nausea. Forty-seven (49%) of the 95 individuals reporting symptoms sought health care in an emergency room or a doctors office. No reports were received for the remaining individuals.

Risk Factors for Drift-Related Illness in Washington

Risk Factors for drift-related illness in Washington include equipment, weather, applicator training, and proximity to residences.

Equipment. The equipment most frequently associated with drift incidents reported to DOH were powered ground sprayers (e.g., orchard airblast sprayers) and aerial equipment (Figure 6). These are also the most frequently used type of equipment for the application of pesticides to agricultural commodities in Washington. Ground applications generally involve the use of airblast sprayers. Airblast sprayers use high pressure and a fine spray to evenly coat both sides of tree leaves in orchards. Use of equipment that produces a fine spray is more likely to result in drift because small droplets are more easily carried by the wind than large droplets. Aerial equipment lays a swath of spray in the air above the crop. Best management practices for control of drift with these types of equipment include the use of air induction nozzles, lowering pressure and increasing water volume to increase droplet size, and avoiding weather conditions that favor drift. Detailed guidance on best management practices for different equipment types is available from the National Spray Drift Task Force at http://www.agdrift.com/Text%20pages/Pub_PDF.htm.

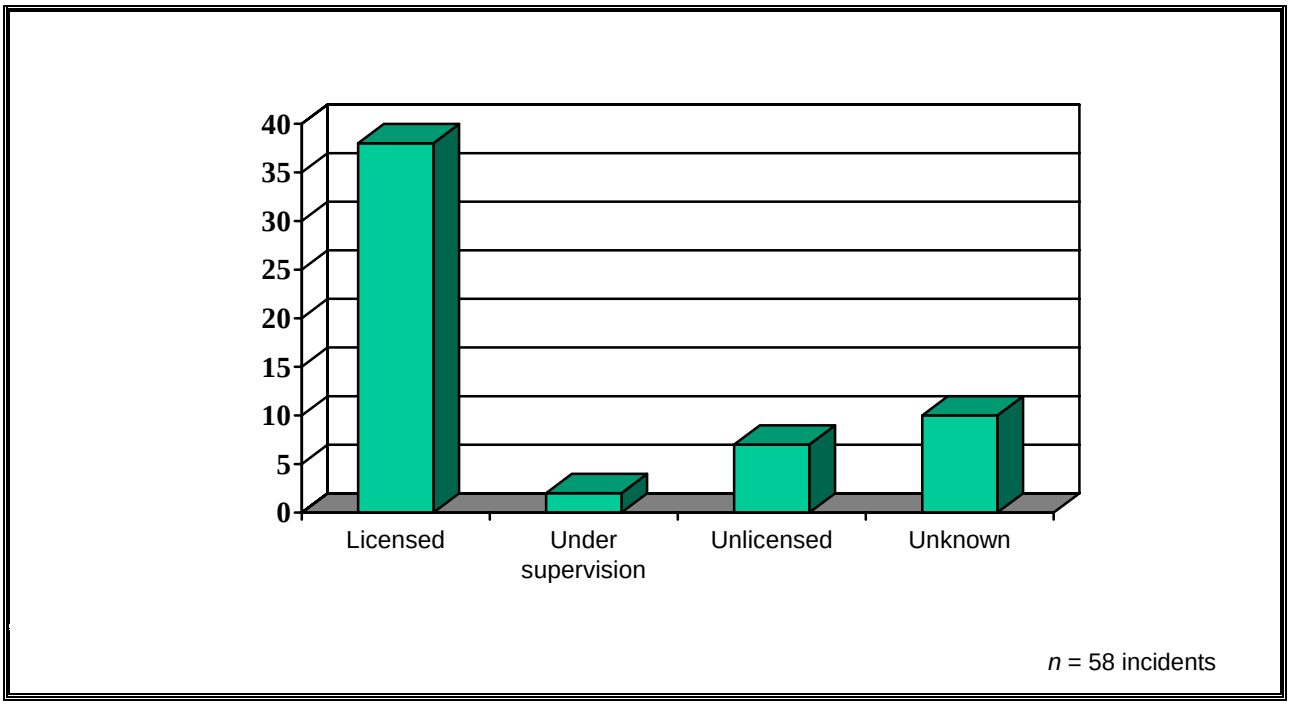
Figure 6. DOH Drift DPP Cases by Type of Application Equipment, 2002 and 2003



Weather. Weather conditions such as wind speeds over ten mph, presence of wind gusts, and temperature inversions increase the risk of pesticide drift. Applicators are required to report wind speed, wind direction, and air temperature on pesticide spray records for each application, but most spray records associated with DOH cases did not indicate that adverse weather conditions were present. Eye witness accounts and data from local weather stations collected during case investigation indicated that windy conditions were present in about 15 percent of the cases.

Applicator training. Although DOH does not specifically track applicator misjudgment as a risk factor, it appears that applicator error was a common feature of drift cases. Thirty-eight (81%) of the 47 drift incidents in the DOH data set for which licensure information was available involved a licensed pesticide applicator. These are applicators who have passed a licensing test and who must complete continuing education credits to maintain their license. State pesticide law allows an unlicensed person to apply pesticides if they are working under the supervision of a licensed applicator. Only two of these 47 drift incidents involved an unlicensed applicator working under supervision; however, poor supervision did not appear to be a problem. The license status of the applicator was unknown for ten of the 58 drift incidents (Figure 7).

Figure 7. DOH Drift DPP Cases by License Status of Applicator, 2002 and 2003



Proximity to residences. Sixty percent of DOH drift cases involved pesticide drift to a residence. Many of these residences border working agricultural land. There are a variety of methods for preventing drift to nearby residences including observing spray buffers, use of alternative spray methods or non-spray methods when controlling pests near residences, planting trees along borders to incept drift, land use planning that includes buffers between residential housing and agricultural operations, and coordination with neighbors to spray at times when exposure to an accidental drift is unlikely. A recent analysis of WSDA drift investigations data showed that while drift distances were highly variable, they were commonly documented 100 feet from airblast sprayers and 1000 feet from aerial applications. More information on this study is available at http://agr.wa.gov/PestFert/Publications/docs/2004Driftdistance61804.pdf.

Drift Incidents Investigated by the Washington Department of Agriculture

The WSDA investigates complaints about drift associated with crop injury, bee kills, and residue on vehicles and property, and complaints about human exposures to drift. Approximately one-third of all of the WSDA complaints received involve some aspect of pesticide drift. In 2002, WSDA received 59 complaints about drift to property or crops and 28 complaints about human exposures to drift. In 2003, WSDA received 45 complaints about drift to property or crops and 17 complaints about human exposure to pesticide drift. Residue was found off-target in 22 of the cases, verifying that drift occurred. Table 9 shows the complaints received by WSDA involving allegations of pesticide drift for 2002 and 2003. Because WSDA refers reports of human illnesses to DOH, the incidences included in Table 8 are also included in the DOH section of this report.

Table 9. WSDA Drift Complaints, 2002 and 2003			
Year	**General Drift Complaints**	**Drift Involving Human Exposure***	**Total**
2002	59	28	87
2003	45	17	62

** Drift cases involving alleged human illness are referred to DOH and are in the DOH data set if they were considered definitely, probably, or possibly related to the pesticide exposure.*

Consistent with DOH human exposure data, most of the agricultural non-human exposure drift complaints reported to WSDA were related to ground applications to orchards, which generally involve airblast sprayers. There were 11 complaints about drift from aerial applications in 2002 and 12 complaints about drift from aerial applications in 2003. Aerial applications to wheat generated five of the 11 complaints for 2002 and four of the 12 complaints for 2003. Economic losses of $5000 or more can easily occur when spotting appears in sensitive crops such as alfalfa or spinach, herbicide drift damages adjacent crops or shelter plantings, or when residues are found on a crop where that pesticide is not allowed, making the crop unmarketable. Economic losses can occur when organic crops are decertified due to pesticide drift.

Most of the non-agricultural drift cases are from commercial lawn care companies. This is not surprising given the number of applications in close proximity to other residences. In cases that do not involve human exposure, concern stems from unwanted residues rather than from economic damage as most of the products applied are insecticides and no physical plant damage occurred.

Conclusions and Recommendations

Pesticide drift is an important cause of pesticide-related illness in Washington. Prevention efforts should target aerial and ground applications to tree fruit. Strategies for preventing drift may include increased use of non-pesticide pest management (mating disruption with pheromone, for example), new technologies that reduce drift (air induction nozzles and tunnel sprayers, for example), education of pesticide applicators and farm managers about best management practices for drift reduction, recognition and incentives for applicators and farms who operate with best management practices, and disincentives to applicators and farm managers who cause drift.

More attention is needed to protect residences near agricultural fields. Use of buffers and vegetated strips may help prevent drift from reaching neighboring residences. Adoption of new nozzle and sprayer technology could reduce production of driftable particles. Pre-notification of nearby residents would allow them to close windows and further minimize the effect of an accidental drift.

Cholinesterase Monitoring

The Department of Labor and Industries adopted chapter 296-307-148 WAC, Cholinesterase Monitoring, in December 2003. The cholinesterase monitoring rule became effective February 1, 2004. The rule requires agricultural employers to document hours employees spend handling

toxicity category I or II organophosphate or N-methyl-carbamate cholinesterase-inhibiting pesticides. Employees who meet a specified handling hour threshold are provided with the opportunity to participate in annual baseline and periodic laboratory testing of blood cholinesterase levels during the application season. Over exposure to these pesticides results in depressions in blood cholinesterase activity. Monitoring cholinesterase activity in the blood can detect cholinesterase depression prior to the onset of illness.

The DOH Public Health Laboratory (PHL) performs cholinesterase testing on serum and red blood cells of enrolled workers. The DOH Office of Epidemiology built and manages the Cholinesterase Monitoring Data System (CMDS), which receives test results from PHL, matches baseline and periodic farmworker test results, calculates percent change from baseline to periodic results, and generates alert reports for farm workers based on threshold percent depression values.

When a serum cholinesterase depression of more than 20% below baseline or a red blood cell (RBC) depression of more than 30% below baseline is identified, employers are required to evaluate their pesticide worker protection program and make corrections to prevent further over-exposure. When a serum depression of 40% or more below baseline or an RBC depression of 40% or more below baseline is identified, employers are required to remove employees from pesticide handling duties.

According to CMDS data as of September 30, 2004, 2,630 workers enrolled in the cholinesterase monitoring program during 2004. A baseline test was performed for each enrolled worker. One or more periodic tests were performed for 580 workers, for a total of 911 periodic tests. A total of 201alerts were issued for 122 farm workers. Alerts were issued for 95 workers at the workplace evaluation level and for 27 workers at the workplace removal level. Overall, the data suggests that about 20% of enrolled workers experienced cholinesterase depression during 2004. These data may differ from reports published elsewhere due to continued data quality management procedures.

At the time of publication of this report, L&I is still analyzing information related to 2004 cholinesterase monitoring activities and as such this is an initial report for the activity in 2004. L&I provided consultations at 40 orchards and 35 employers in response to cholinesterase depressions. The consultants were asked to gather basic information about the circumstances of the depression and the employer's response to it. One of the inherent limitations of any such investigation is that it is likely to take place (at best) several weeks after the exposure in question has occurred and it is difficult to reconstruct events based on employer and employee interviews. In many cases, employers with reported depressions appeared to have basic programs in place to protect their employees from pesticide exposure and it was not always possible to document likely problems that may have contributed directly to the reported depression. However, several general observations and recommendations were developed from the consultation information obtained:

- One common factor in the operations with reported depressions was the application of covered pesticides using air-blast sprayers towed by tractors.
- Half-face respirators were the predominant choice for protection. A half-face respirator leaves the skin above and around the respirator open to contamination.
- Respirator cartridge replacement practices, fit testing protocols, storage practices, and employee training need to be improved.

- Employers need to make sure all of their chemical gear fits the employees well.
- Employers need to enforce strict decontamination procedures every time handlers and applicators remove chemical gear such as coats, pants, gloves, boots, and respirators.
- Mixers and applicators need to thoroughly wash their face, neck, and any other potentially exposed skin immediately after applications and their face and hands before eating, drinking, smoking, or using the restroom.
- Proper gloves (providing dexterity and protection) need to be worn when unclogging spray nozzles.
- Some employees wear a cotton baseball cap or bandana during application. Employers need to address this issue, restricting its use during applications or providing chemical resistant visors or caps for use during pesticide handling.
- The WISHA consultation staff encountered the suggestion that handlers may be less careful applying Sevin when used as a chemical thinning agent, apparently believing it is not as dangerous because it is not being applied for insect control.
- The WISHA consultation staff also noted that the label on Lorsban 4E declares that application does not require respirator use. Employers have gone beyond the label requirement and require the use of a respirator when applying Lorsban and this was confirmed by employee interviews.

The DOH and L&I have an agreement that if L&I finds that the worker experienced symptoms associated with the depression, the case will be referred to DOH for investigation. There were no such referrals during 2004.

Department of Labor and Industries WISHA is required to evaluate the cholinesterase monitoring rule by organizing a scientific advisory committee and a stakeholder advisory committee. The scientific committee has analyzed the first year of program operations and results and is expected to complete a report on the first year of program operations and results by the end of 2004. The report will provide guidance for the 2005 growing season. In addition, L&I will be receiving recommendations from the stakeholder advisory committee and will provide a report to the Legislature in January 2005 on the results of data collection, correlation, and analysis related to cholinesterase monitoring in 2004. The Public Health Laboratory will continue testing cholinesterase for the L&I monitoring program in 2005 and the Office of Epidemiology will continue to manage the data system. The law allows for private laboratories to participate in the program in 2006. L&I is expected to manage the data systems beginning in 2006 or 2007.

More information on the cholinesterase monitoring rule is available at the L&I cholinesterase monitoring web site at http://www.lni.wa.gov/Safety/Topics/AtoZ/Cholinesterase/default.asp.

Compliance with the Worker Protection Standard

During 2002 and 2003, WSDA conducted a series of Worker Protection Standard (WPS) inspections at agricultural sites. These inspections were classified as “Tier-I: Business place was inspected for compliance but workers were not interviewed” or “Tier II: Workers were interviewed.” Fifty Tier-I and 15 Tier-II inspections were conducted, as well as inspections of ten dealers. The major WPS violations identified were:

- Failure to post information on pesticide applications at a Central Notification Board
- Failure to conduct Pesticide Safety Training for workers
- Insufficient Decontamination Supplies for handlers at mix/load sites.

The WSDA issued Notices of Correction in most cases and the violations were corrected. Washington State Department of Agriculture continues to work with growers to provide WPS compliance assistance information.

In 2004, DOH evaluated the usefulness of a set of five interview questions designed to assess the effectiveness of WPS training. These questions pertain to the posting of or instructions about re-entry intervals, and whether or not the worker received training about PPE, the hazards of pesticides, and where to seek help in an emergency. Interview methods used to obtain these data were reviewed, and data from previous years were analyzed. Following are the findings of this preliminary study.

- Data sets on these variables are incomplete due to challenges and barriers associated with the agricultural worker interview process.
- The questions should be reworded so that they are easier for the agricultural worker to answer and to better elicit information about whether or not the agricultural worker received training and understands safety requirements and procedures.
- Other PIRT agencies, including WSDA and L&I, are currently reviewing WPS training data that are collected during investigations and inspections. These data may be useful for the DOH in developing interview tools and methods for eliciting information about farmworker training.

The WSDA, L&I, and DOH coordinate investigations of incidents involving farm workers and enforcement of the Worker Protection Standards. The three agencies have a Memorandum of Understanding regarding collection of evidence and inter-agency referrals to facilitate thorough investigation of complaints without unnecessary duplication of effort. The agencies coordinate Train-the-Trainer courses. These workshops are specifically designed for people who conduct pesticide safety training at agricultural establishments.

Changing Pattern of Pesticide Usage

Action Recommendation 5 (2003) was to examine changing patterns of pesticide usage in Washington. PIRT agencies looked at two usage issues during this period: the regulatory phase-out of diazinon and chlorpyrifos for home use, and professional indoor pest control.

Regulatory Phase-out of Diazinon and Chlorpyrifos for Home Use

One of the most significant recent changes in pesticide use has been the regulatory phase-out of diazinon and chlorpyrifos (organophosphate insecticides) for home use. Department of Health and WPC reviewed their data on human exposures and reported illnesses associated with residential use of these two insecticides. These data show a marked decline in reported exposures and illnesses involving these compounds over the phase-out period.

Figure 8. WPC Calls Concerning Chlorpyrifos Exposures, 1999 – 2003

Figures 8 and 9 show the number of calls to WPC concerning human exposure to chlorpyrifos (e.g., Dursban, Lorsban) and diazinon from 1999 through 2003.

While these human exposures were not restricted to residential pesticide use, residential use comprises the bulk of WPC pesticide calls, and the decline in human exposures to these two insecticides probably reflects the decline in their residential use.

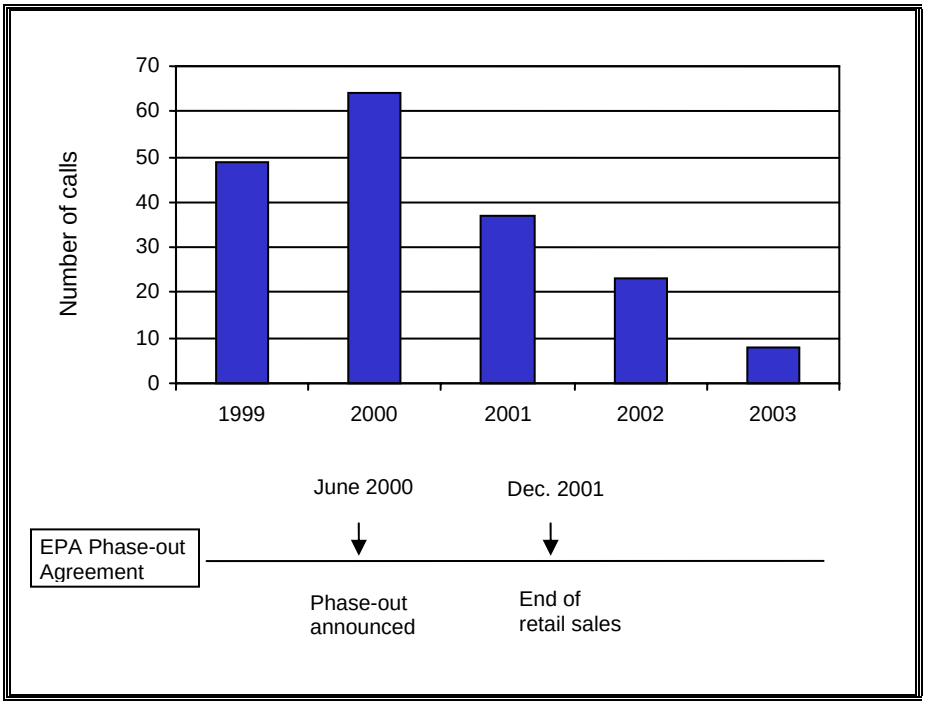


Figure 9. WPC Calls Concerning Diazinon Exposures, 1999 – 2003

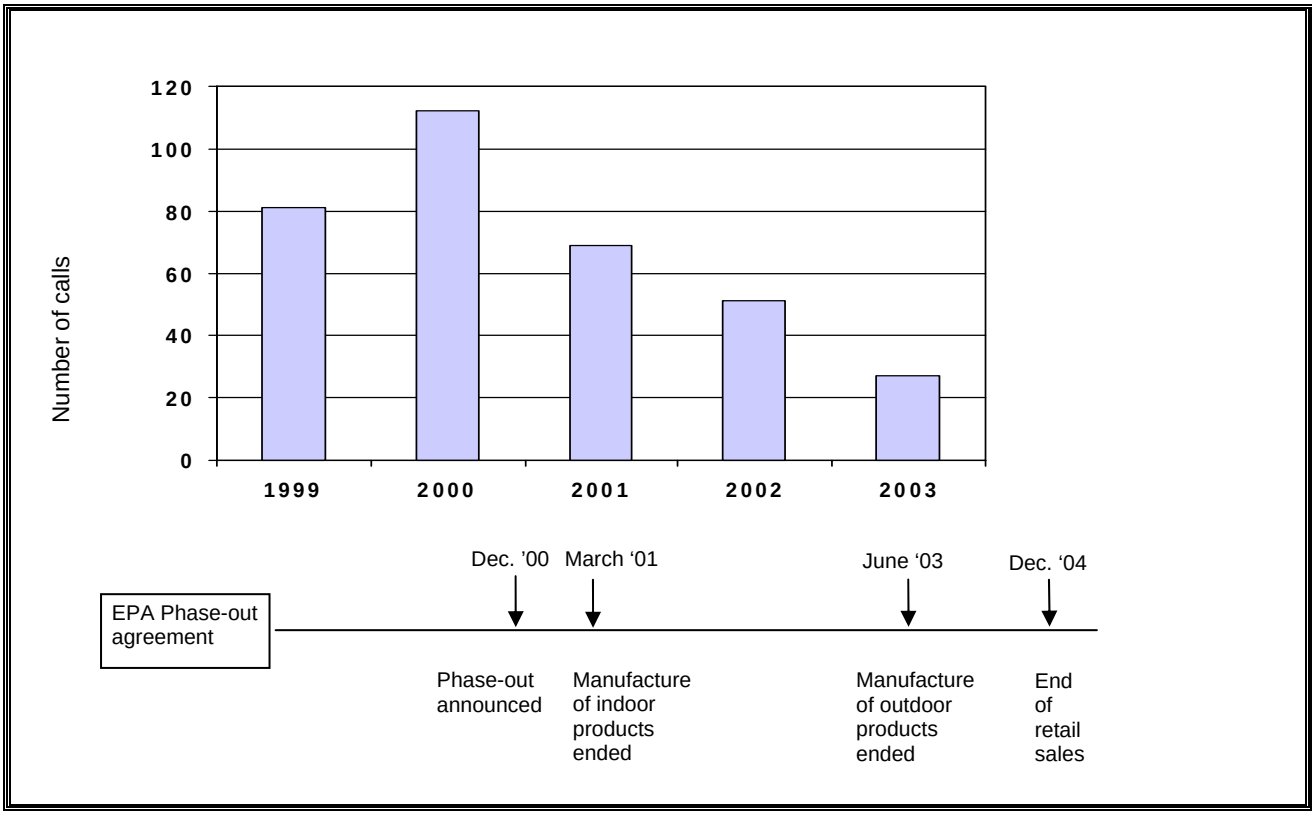


Figure 10. DOH Cases Involving Non-Agricultural Use of Organophosphate Insecticides, 1997 – 2003

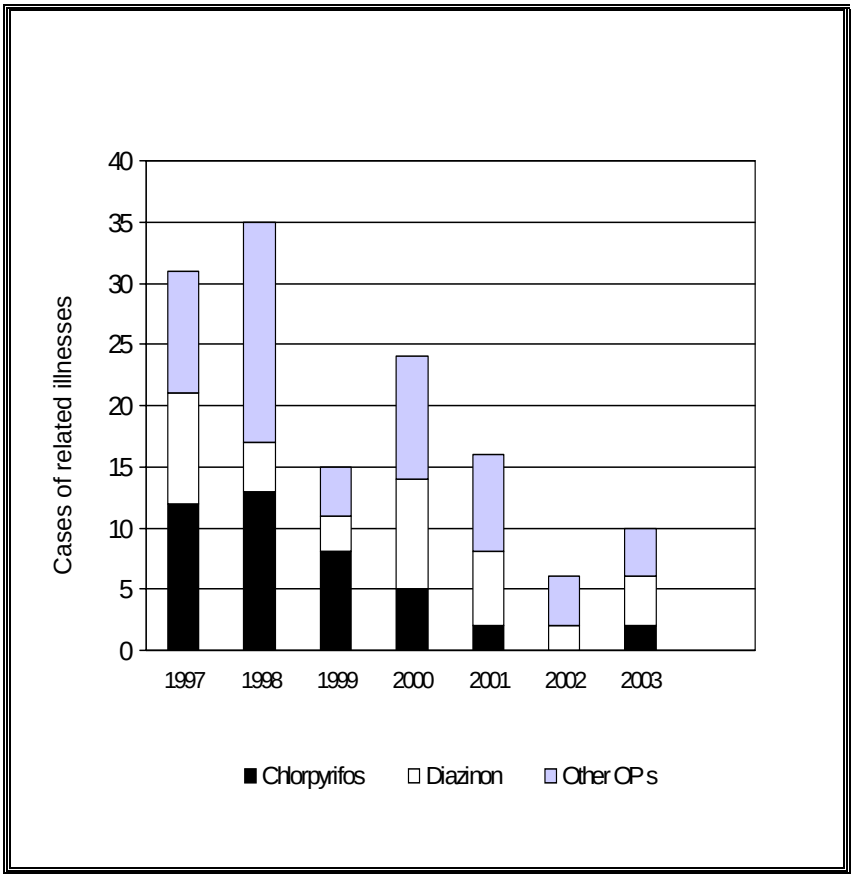


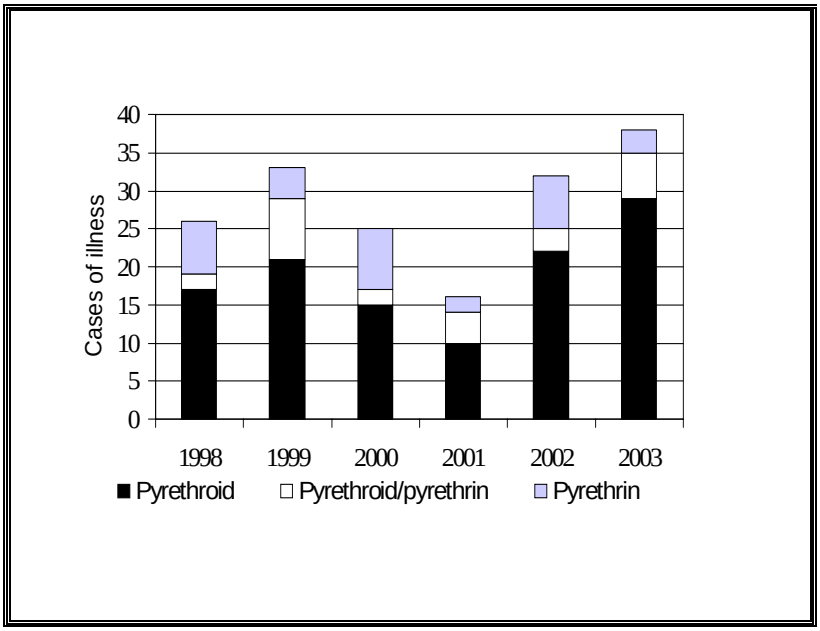
Figure 10 shows the decline in definite, probable, and possible cases of human illness involving non-agricultural use of organophosphate insecticides reported to DOH between 1997 and 2003.

This marked decline in DOH chlorpyrifos cases coincides with its rapid regulatory phase-out from residential use. The decline in residential diazinon cases is less clear. This may be because the phase-out of diazinon has been more gradual with sales permitted until December 2004. A decline in reported illness cases was also noted for other organophosphate insecticides.

Limited sales data obtained by King County Solid Waste indicate that carbaryl and pyrethroid insecticides are being marketed as the primary replacements for the phased-out organophosphates. Both WPC and DOH data show increases in exposure calls and in reported illnesses and injuries associated with pyrethroid insecticides. Only very low numbers of illnesses associated with carbaryl (one-three cases per year) have been reported.

Figure 11. Department of Health Cases Involving Non-Agricultural Use of Pyrethroid Insecticides, 1998 – 2003

Figure 11 shows an increase in definite, probable and possible cases of acute pyrethroid-related illnesses and injuries reported to DOH between 1998 and 2003.



Professional Indoor Pest Control

PIRT looked at changing patterns in illness cases associated with professional pest control in urban buildings. In a presentation to PIRT in 2003, Terry Whitworth, PhD, (entomologist, Whitworth Pest Solutions, Inc.) indicated that significant product shifts were occurring for pesticide use in professional treatments inside people's homes or workplaces for ants, termites, bees, powder-post beetles, fleas, and spiders.

Department of Health compared data from the two-year period 1998-1999 with the two-year period 2002-2003 to identify trends in pesticide illness. Sixty-six cases determined to be definitely, probably, and possibly related to pesticide exposure were included in the comparison. Only a small number (eight) of these 66 cases were illnesses among pesticide applicators. Most of the cases involve symptoms reported when residents return to their home or workers return to their office or other building after a professional pesticide treatment. The data in Table 10 show a clear decline in organophosphate cases involving professional treatment for indoor pests. Pyrethroid cases have not increased for this type of application. There appears to be an improvement in public health with the shift away from organophosphate insecticides for professional indoor pest control.

Table 10. Pesticides Associated with DOH Cases* Involving Professional Pest Control in Buildings, 1998 and 1999; 2002 and 2003		
Products involved	**Cases 1998-1999**	**Cases 2002-2003**
Organophosphate insecticides (Chlorpyrifos)	8	0
n-methyl carbamate insecticides (Bendiocarb)	2	0
Pyrethrin/pyrethroids (Cyfluthrin, permethrin, deltamethrin, pyrethrins)	27	21
OP/pyrethroid combinations	2	0
Other (Copper naphthenate, Vikane fumigant, anti-mold carpet products)	5	1
Total	44	22

** Limited to cases with illness classified by DOH as definitely, probably, or possibly due to pesticide exposure.*

West Nile Virus

The arrival of West Nile virus in Washington State may lead to increased pesticide use and, consequently, to an increase in pesticide incidents reported to PIRT agencies. The panel recommended proactive steps to prevent incidents. These steps include:

- Develop a method to monitor pesticide events associated with control of West Nile virus (for example, illnesses, spills, label violations).
- Establish use permit restrictions on mosquito control applications to safeguard public health and other non-target species.
- Educate the public about safe mosquito control.

West Nile virus in Washington State

The WNV is a disease spread to birds, horses and humans by infected mosquitoes. West Nile virus can occasionally cause severe illness. Severe illness can include high fever, inflammation of the brain, lasting neurological impairment, and death. The risk of serious illness and death from infection is highest in people over age 50.

Washington is the only state in the contiguous United States that did not detect West Nile virus activity in 2004. More than 2,200 human cases were reported in the United States between January and November 2004; one case was reported in a Washington traveler who contracted the virus while visiting Colorado.

In Washington, state and local health departments, mosquito control districts, and many other partners monitor for West Nile virus in birds, horses, sentinel chickens, and mosquitoes. There were no positive detections of WNV in 2004.

Tracking Pesticide Use

The use of larvicides for mosquito control can be tracked by the National Pollutant Discharge Elimination System (NPDES) permits issued by Ecology. The NPDES permit data complied by Ecology for 2003 are presented in the Ecology section of the report. The leading larvicide used in 2003 was a natural biocontrol agent *bacillus thuringiensis isrealensis* (bti). This product is one of the lowest toxicity products effective against mosquito larvae.

There is presently no tracking of pesticides used to kill adult mosquitoes although a mechanism does exist for doing this. Mosquito control districts and other entities conducting area-wide mosquito control are required to keep records of the location and the amount of products used. WSDA can request these records if there is sufficient benefit to justify the cost.

The DOH added a code to their data system in 2002 to track illnesses associated with community disease vector control. This allows DOH to specifically identify pesticide cases associated with West Nile virus control. The DOH also tracks incidents involving repellents. The data in Table 11 will serve as a baseline for comparison after West Nile virus has arrived in Washington.

Table 11. DOH Cases* Associated with Mosquito Control, 2002 and 2003

	2002	2003
Adult mosquito control	3	4
Larval mosquito control	0	0
Mosquito repellent	1	6

** Limited to cases with illness classified by DOH as definitely, probably, or possibly due to pesticide exposure.*

Area-wide adult mosquito control. There were three events reported involving seven people in the two-year period. All reported exposure to adult mosquito sprays (malathion or pyrethroids) during community-wide mosquito control. Symptoms reported were mild irritant symptoms. Only one person sought medical care.

Larval mosquito control. There were no reported human illness cases associated with larval mosquito control.

Repellents. There were seven reported cases of mild eye irritation or injury after exposure to a Deet-based insect repellent. One hiker reported skin burn and blisters after concentrated repellent leaked onto his back from his backpack. DEET-based repellents can cause skin irritation and chemical conjunctivitis with symptoms lasting several days. Children should be supervised around repellents. Lotion formulations are easier to control than sprays when applying to face or neck.

The Ecology Spill Program added pesticide questions to their spill data collection forms. Information on the cause of release, including pesticide use for mosquito control, is available in the case report narratives. No incidents involving mosquito control applications were reported to the spill program in 2002 or 2003.

Permit Restrictions

Applications of pesticides to water are restricted to licensed pesticide applicators. Licensed applicators are trained in pesticide laws and must pass a state test to receive a license from

WSDA. Applications to water for control of mosquito larva require a National Pollutant Discharge Elimination System (NPDES) permit from Ecology. Permit conditions include:

- require mosquito monitoring
- restrictions on certain pesticides
- provisions to protect sensitive species
- requirements to pre-notify the public of pesticide applications

Permit holders are also required to follow approved best management practices (BMPs) for mosquito control. The BMPs were developed to guide mosquito control efforts that are effective and use integrated pest management options. The permit conditions are available at http://www.ecy.wa.gov/programs/wq/pesticides/final_pesticide_permits/mosquito/mosquito_permitmod052604-signed.pdf. Approved BMPs are available at http://www.ecy.wa.gov/biblio/0310023.html.

Education

The DOH West Nile Virus Program has developed and distributed on-line and printed educational materials for the general public about how to safely protect themselves from West Nile virus.

- The DOH strongly encourages people to read the brochures *West Nile Virus: Do you know what's biting you?* and *Mosquito Repellent – How to Use It Safely* (http://www3.doh.wa.gov/HERE/materials/HERE_Materials.aspx).
- Information and clinical resources have also been organized for health care providers and veterinarians.
- The Department has participated in numerous training events for local health staff on mosquito control and West Nile virus.
- Department of Health has developed a web site http://www.doh.wa.gov/WNV for mosquito-related educational materials and for the current status of West Nile virus in Washington and neighboring states.

The DOH recommends the following to control mosquitoes and West Nile virus: (1) mosquito surveillance, (2) public education on the mosquito life cycle, (3) public education about eliminating breeding sites (standing water), (4) larvaciding if surveillance indicates that breeding populations of a vector species are exceeding action thresholds (set locally) and (5) personal protection from mosquito bites. If there is an outbreak of human cases, mosquito adulticides may be considered by local officials. The DOH continues to review toxicity information on the pesticides used in mosquito control and to provide guidance to local officials. For more information on West Nile virus see http://www.doh.wa.gov/ehp/ts/Zoo/WNV/LocalHealth.html.

The WSDA highlighted West Nile virus in the July 2003 Pesticide Notes newsletter published by the Pesticide Management Division. This newsletter goes to all licensed pesticide applicators in the state and is part of their continuing education. The newsletter included:

- Bird, horse and human surveillance for WNV.
- Licensing requirements for mosquito control.
- How to attend WSU pre-license training in aquatic and public health pest control.
- How to obtain a NPDES permit.
- Pest control techniques for mosquitoes.